

Claims

What is claimed is:

1. A modular vehicle, the modular vehicle comprising:
 - an engine unit associated with vehicular electronics;
 - a mower unit mechanically connected to the engine unit, the mower unit associated with mower electronics;
 - a communications link between the vehicular electronics and the mower electronics supports the communication of status data associated with the mower unit;
 - a controller is programmed to stop an operation or activity of the mower unit in response to detection of a deficient communications channel associated with the communications link.
2. The modular vehicle according to claim 1 wherein the communications link further comprises a transmission line; a status signal associated with the transmission line indicating whether the mower unit is coupled or decoupled to the engine unit.
3. The modular vehicle according to claim 1 wherein the communications link further comprises a first wireless transceiver and a second wireless transceiver; a status signal associated with the first wireless transceiver and the second wireless transceiver indicating whether the mower unit is coupled or decoupled to the engine unit.
4. The modular vehicle according to claim 1 further comprising:
 - a user interface;
 - a transceiver coupled to the user interface and supporting remote control of at least one of the following: emergency stopping of the mower unit, emergency stopping of a blade of the mower unit, adjustment of mowing height of the mower unit, activating rotation of the blade of the mower unit, deactivating rotation of the blade of the mower unit, directing motion of the mower unit, directing a position of the mower unit, and detecting an obstacle around the mower unit.

5. The modular vehicle according to claim 1 further comprising:
 - a location-determining receiver for determining a location of the engine unit;
 - a path planning module for establishing a planned path for the engine unit,
 - a navigation module for guiding the vehicle along the planned path based on the determined location,
 - an obstacle detection module to detect obstacles in at least one of the planned path and a defined region about the mower unit.
6. The modular vehicle according to claim 1 further comprising:
 - an obstacle detection sensor for detecting obstacles in a defined region about the mower, the obstacle detection sensor associated with the mower electronics.
7. The modular vehicle according to claim 1 wherein the vehicle electronics further comprise a mower controller for managing at least one of an emergency stop switch, a blade clutch actuator, a mow height actuator, an engine disable switch, and an obstacle detection sensor.
8. A modular vehicle, the modular vehicle comprising:
 - an engine unit;
 - an engine management controller associated with the engine unit;
 - a throttle actuator associated with the engine management controller;
 - a mower unit associated with mower electronics;
 - a blade clutch actuator associated with the mower electronics; and
 - a transmission line for conveying data between the engine management controller and the mower electronics.
9. The modular vehicle according to claim 8 wherein the transmission line further comprises a connector having a first connector portion associated with the engine unit and a second connector portion associated with the mower unit.

10. The modular vehicle according to claim 8 further comprising:
 - a user interface;
 - a transceiver coupled to the user interface and supporting remote control of at least one of the following: emergency stopping of the mower unit, emergency stopping of a blade of the mower unit, adjustment of a mowing height of the mower unit, activating rotation of a blade of the mower unit, deactivating rotation of the blade of the mower unit, directing motion of the mower unit, directing a position of the mower unit, and detecting an obstacle around the mower unit.
11. The modular vehicle according to claim 8 further comprising:
 - a location determining receiver for determining a location of the engine unit;
 - a path planning module for establishing a planned path for the engine unit,
 - a navigation module for guiding the vehicle along the planned path based on the determined location,
 - an obstacle detection module to detect obstacles in at least one of the planned path and a defined region about the mower.
12. The modular vehicle according to claim 8 further comprising:
 - an obstacle detection sensor for detecting obstacles in a defined region about the mower, the obstacle detection sensor associated with the mower electronics.
13. The modular vehicle according to claim 8 wherein the vehicle electronics further comprises a mower controller for managing at least one of an emergency stop switch, a blade clutch actuator, a mow height actuator, an engine disable switch, and an obstacle detection sensor.
14. A method for managing a modular vehicle, the method comprising:
 - providing an engine unit having a first electrical connector portion;
 - providing a mower unit having a second electrical connector portion for engaging or electrically communicating with the first electrical connector portion;
 - mechanically joining the engine unit and the mower to form an electrical

connection or electromagnetic connection between the first electrical connector portion and the second electrical connector portion; and

determining if the electrical connection or electromagnetic connection formed is or has been broken or provides a deficient communications channel.

15. The method according to claim 14 wherein the deficient communications channel means that no electrical current or electromagnetic energy is conducted through the transmission line between the mower unit and the engine unit because of the lack of a complete direct current circuit or a complete alternating current circuit.

16. The method according to claim 14 further comprising stopping an operation or activity of the mower unit, if the electrical connection or electromagnetic connection has been broken or provides deficient communications.

17. The method according to claim 14 wherein the operation comprises one or more of the following: (a) disengaging a blade of the mower unit, (b) activating a blade clutch or a blade clutch actuator to withdraw rotational power from a blade of the mower unit, (c) stopping the rotation of a blade via a clutch actuator of the mower unit, (d) changing the throttle setting via the throttle actuator to reduce or eliminate the flow of fuel to an internal combustion engine of the mower unit, (e) switching off high voltage provided to one or more spark plugs of an internal combustion engine of the mower unit, (f) shutting off electrical energy provided to an electrical system of an internal combustion engine of the mower unit, and (g) turning off the internal combustion engine of the mower unit.

18. The method according to claim 14 further comprising transmitting status data on the operation of the mower unit from at least one sensor of the mower unit to the engine unit via the electrical connection.

19. A method of managing a modular vehicle, the method comprising:

providing an engine unit having a first wireless communications device;
providing a mower unit having a second wireless communications device;
joining the engine unit and the mower unit to form a mechanical connection;
and

communicating status data on the operation of the mower unit between the first wireless communications device and the second wireless communications device upon or after detection of the joining.

20. The method according to claim 19 further comprising stopping an operation of the mower unit if the mechanical connection between the engine unit and the mower unit is severed or absent.

21. The method according to claim 20 wherein the stopping comprises sending command data to the mower electronics via the first wireless transceiver and the second wireless transceiver to do one or more of the following actions: stopping the operation of the mower unit, stopping the rotation of one or more mower blades of the mower unit, shutting-off the internal combustion engine of the mower unit, stopping the mower unit from moving, activating the blade clutch actuator, and actuating the obstacle detection sensor.

22. The method according to claim 20 wherein the stopping comprises the mower electronics generating command data to do one or more of the following actions: stopping the operation of the mower unit, stopping the rotation of one or more mower blades of the mower unit, shutting-off the internal combustion engine of the mower unit, or stopping the mower unit from moving.